What is a serving size?

Background

Food labels and other food guides often use “serving size” to describe a recommended single portion of food. Serving sizes are different for various kinds of food (liquid versus solid foods and cooked versus raw foods). In many cases, the amount specified as a “serving size” for a particular food is smaller than the amount typically eaten.

Frequently, the serving sizes listed on “Nutrition Facts” labels of food packages are larger than the serving sizes listed by other food guides to healthy eating, such as the FDA Food Plate. Serving sizes listed on food labels are designed to make it easier to compare the calorie, carbohydrate, and fat content of similar products and to identify nutrients present in a food. Used appropriately, the information on food labels can help consumers make better food and nutrition choices.

This activity introduces students to dry food measurements and to understanding what is a “serving size.”

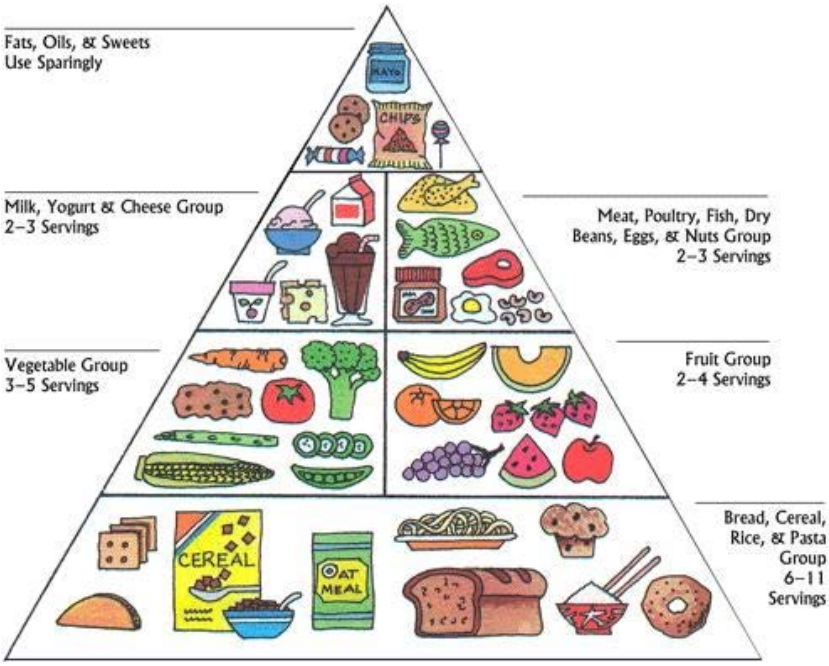
Instructional Objectives

The student will

- Estimate serving sizes of different foods and compare their estimates to “actual” serving size information provided on a “Nutrition Facts” food label.
- Calculate the percent of change between their estimated serving size and the recommended serving size from the “Nutrition Facts” food label.

NASA Relevance

Nutrition is critical for all aspects of human health, on Earth and in orbit. Without adequate nutrition, problems can arise for every single system in the body, from bone to blood and from the heart to the brain. Ensuring astronauts have the right nutrients in the food they eat while in space is critical for their health both on orbit and after they return to Earth. To ensure that astronauts will be able to perform their jobs during a mission, it is important that they receive adequate daily caloric and nutritional intake to maintain their energy levels and good health. Additionally, it is important to provide a large variety of foods to the International Space Station (ISS) crews that stay in orbit for long periods of time (4 – 6 months). Without sufficient variety, crew members may begin to decrease the quantity of food they consume due to over consumption of one type of food. Inadequate food consumption, of course, leads to inadequate nutrition. Good nutrition is critical to ensure that other health measures (such as exercise) are successful. Maintaining an astronaut's health and fitness for return to Earth's gravity is crucial.



The New Food Pyramid

Preparing For the Activity

Student Materials (four students per group)

- 3 – 4 paper plates (for dry foods)
- 1 Standard 2 cup measuring cup
- Scale for measuring weight (*optional*)
- 1 permanent marker
- What is a Serving Size? – Student Handout
- Labels & Estimates handout (*extension*)
- Quick Hand Measurements handout (*extension*)

Teacher Materials

- 1 – 2 packages of each of the following foods: Large bag of loose M & Ms, dry breakfast cereal, and popped popcorn. Note: The teacher can substitute any foods that they choose.

  (Before you begin remove and save "*Nutrition Facts*" labels from packaging)

- Gallon or Sandwich size plastic baggies to contain the loose food items

Setup for Activity

Allow 10 - 15 minutes for setup and 45 – 60 minutes to conduct activity

Setup

Randomly pour different amounts of M & Ms, cereal, and popped corn (or any substitute foods that you choose) into large gallon or sandwich size plastic baggies.

Note: Amounts must be more than actual severing sizes. The students will use these bags of food to make their predictions and measure their portion sizes.

Lesson Description

ENGAGE

Begin by asking your students, “What is a serving size?” Use the student’s answers to guide them into a discussion of food portions. Explain that food portions frequently are measured in terms of cups, grams or other units. Show students the premeasured plastic baggies of the dry foods they will be using in this activity. Point out to the students that each of the units commonly used in cooking can be translated to Standard International (metric) units, such as liters (L) or grams (g).

After students have discussed food portions and serving sizes, using pictures of food items, challenge them to predict serving sizes for liquid and solid foods below. See Figure 1 below.

PORTIONS VS SERVINGS*

FOOD ITEM	NORMAL PORTION	NUMBER OF SERVINGS
Bagel	1 whole	4
Muffin	1 large	3
Cinnamon bun	1 large	4
Flour tortilla	1 burrito-sized	2
Tortilla chips	1 individual bag	2
Popcorn	Movie theatre medium (16 cups)	8
Baked potato	One large	3
French fries	Medium order (4 oz)	4
Fried chicken	3 pieces (7–8 oz)	3
Steak	13 oz	5
Sliced ham or roast beef	Amount in typical deli sandwich (5 oz)	2

** Portions of many common foods consist of more than one “serving size.”*

Figure 1

EXPLORE

Have "Materials Managers" pick up the materials for each group. Give each group a copy of the *What is a Serving Size?* - Student Handout. Have students follow the instructions in the handout and label the plates of dried foods. Then have the students predict what they "think" will be an appropriate portion size for each of the three to four foods.

Once students have completed their predictions, allow each group to measure and place the corresponding amounts of each food onto the paper plates. These measurements may involve simply counting the individual pieces (e.g. M & Ms, cereal or popped popcorn), weighing, or measuring in a standard 2 cup measuring cup. Then have the students record their estimates on the handout.

The teacher will inform the students what the correct serving size amounts are for each food and then have the students record this amount on the handout. Next, the students will compare their estimated serving sizes – to the actual serving size. Then have the students determine the difference between the Actual Serving Size and their Estimated Amounts and record their answers. Last, have the students determine if the estimated amounts on their plates are the same, more, or less than the actual serving sizes and record their answers.

Calculating Percent of Change
This activity is to be used for students in Grades 5 and up

Finally, have the students calculate the *Percent of Change* between their estimated amounts and the recommended amounts.

EXPLAIN

Journal: Write a short paragraph to answer each of the following questions:

- Compare your serving size estimates to the actual serving sizes. Describe any differences.
- Based on the information you collected, why do you think it might be important to look at the serving sizes listed on food labels?
- Estimation skills are an invaluable tool to scientists, engineers, and researchers. What are some other ways you can use estimation skills on a daily basis?
- Allow each group to share its findings with the rest of the class.

EXTEND

Distribute a copy of the Labels & Estimates (Refried Beans) student handout to each student. Help students find other relevant information on the label, such as total calories needed and amounts of important nutrients. Point out the “Quick Hand Measures” of portion sizes on the handout. Ask students, “Do you think food labels can help you make better decisions about what and how much to eat? Explain.”

EVALUATE

Have the class develop a scoring method to evaluate the estimation skills of their peers. One suggestion is for the class to develop the scoring tool based on the range of differences between the estimated serving size and the actual serving size of the four foods.

What is a Serving Size?
Student Handout

Have you ever wondered what the appropriate serving sizes are for different kinds of foods? You will be investigating serving sizes of the foods displayed in your classroom.

You will need three to four paper plates, a standard 2 cup measuring cup and an *optional scale*. Label the paper plates with each food item.

Serving Size: Estimates

1. Write the name of each food under the "Food Name" column in Table 1 – Estimates & Actual Amounts (*see below*).

2. For each food, decide how many cups, fractions of a cup, grams, or number of pieces (e.g. M & Ms, cereal or popped popcorn) that will make up one serving size. This may involve counting individual pieces, weighing, or measuring in a standard measuring cup each food item. Record your estimates on the table under "One Serving Estimates".

3. Using your estimates, measure each food item and place your estimated amounts on each separate labeled paper plate. Next, the teacher will give you the actual serving size amounts for each food; record these amounts under "Actual Serving Size". Compare your estimated amounts on your plates, with the actual serving size.

4. Next, determine the difference between the Actual Serving Size and your Estimated Amounts and record your answers. How does your estimated food portions compare with the actual amounts; are they the same, more, or less than you expected? Fill in last 2 columns with your answers.

Table I. – Estimates & Actual Amounts

Food Names	**One Serving "Estimates"** Measured in pieces, cups, or weight	**Actual Serving Size** Measured in pieces, cups, or weight	**Difference Between Estimated Amounts & Actual Amounts** Actual – Estimated = ??	**Comparison** More, Less, Same

Student Handout – Continued

Serving Size: Calculating Percent of Change

5. Write the name of each of food under the Food Name column in Table II – Calculating Percent of Change (*see below*). Next, record your Estimated and Actual Serving Sizes in the Table below.

6. Compare your estimated amounts to the actual amounts and calculate the Percent of Change.

   To calculate the Percent of Change: Subtract the Estimated Amount from the Recommended Amount to yield the *amount of change*. Then take the Amount of Change and divide it by the Actual Serving Size. Last, change the decimal to a percent by multiplying the result by 100. Record your answers.

Table II. Calculating Percent of Change

Food Names	**One Serving "Estimates"** Measured in pieces, cups, or weight	**Actual Serving Size** Measured in pieces, cups, or weight	**Calculate Percent of Change** Actual Serving Size Amt − Estimate Amt = *Amt of Change* Amt of Change ÷ Actual Size = Decimal Amt of Change Decimal Amt of Change × 100 = Percent of Change	
Example 1	28 grams	35 grams	35 – 28 = 7 7 ÷ 35 = 0.2 0.2 × 100 = 20%	500 – 525 = – 25 (remove neg sign) 25 ÷ 500 = 0.05 0.05 × 100 = 5%
Example 2	525 pieces	500 pieces		

Student Handout - Continued

Journal: Write a short paragraph to answer each of the following questions:

1. Compare your serving size estimates to the actual serving sizes. Describe any differences.

2. Based on the information you collected, why do you think it might be important to look at the serving sizes listed on food labels?

3. Estimation skills are an invaluable tool to scientists, engineers, and researchers. What are some other ways you can use estimation skills on a daily basis?

Labels & Estimates - Student Handout
Extension Activity

Serving sizes often are smaller than the portions we actually eat.

Look for low levels of saturated, hydrogenated and trans fats. These are unhealthy.

Cholesterol is found in foods of animal origin.

Look for foods that have more carbohydrates as fiber and fewer as sugar. Only foods from plants provide fiber.

Protein is important for muscles and growth. It is found in animal and plant foods.

Vitamins and minerals are essential for health. Calcium is important for bones and teeth.

Use this section as a guide for daily planning. The amount of calories needed by each person depends on many factors, including exercise.

Refried Beans
Fat Free

Nutrition Facts

Serving Size 1/2 cup (125g)
Serving Per Container 3.5

Amount Per Serving	
Calories 130	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 490mg	**20%**
Total Carbohydrate 24g	**8%**
Dietary Fiber 7g	**28%**
Sugars 0g	
Protein 9g	**16%**
Vitamin A	**0%**
Vitamin C	**0%**
Calcium	**6%**
Iron	**15%**

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Quick Hand Measurements - Student Handout
Extension Activity

Use the Quick Hand Measures to estimate the size of one serving of different foods.

National Standards

NCTM Mathematics Standards

Number and Operations

- Compute fluently and make reasonable estimates

NSTA Science Standards

Science as Inquiry

- Abilities necessary to do scientific inquiry

Science in Personal and Social Perspectives

- Personal Health

National Health Education Standards

Health Information, Products and Services

- Analyze the validity of health information, products, and services.
- Demonstrate the ability to use resources from home, school, and community that provide valid health information.
- Analyze how media influences the selection of health information and products.

Reducing Health Risks

- Demonstrate strategies to improve or maintain personal and family health.

Setting Goals For Good Health

- Demonstrate the ability to apply a decision making process to health issues and problems individually and collaboratively.
- Apply strategies and skills needed to attain personal health goals.